

Title (en)

SUGAR CHAIN-RELATED GENE AND USE THEREOF

Title (de)

MIT ZUCKERKETTE ASSOZIIERTES GEN UND VERWENDUNG DAVON

Title (fr)

GÈNE APPARENTÉ À UNE CHAÎNE DE SUCRE ET SON UTILISATION

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Application

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Abstract (en)

As a result of dedicated studies, the present inventors succeeded in discovering, for the first time, that fibrogenesis could be suppressed at the physiological tissue level by inhibiting sulfation at position 4 or 6 of GalNAc, which is a sugar that constitutes sugar chains. Furthermore, the present inventors conducted studies using various disease model animals, and as a result, successfully demonstrated that inhibitors of sulfation at position 4 or 6 of GalNAc had therapeutic effects on diseases caused by tissue fibrogenesis (tissue fibrogenic disorders).

IPC 8 full level

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Citation (applicant)

- NATURE, vol. 446, 26 April 2007 (2007-04-26)
- DANICA P. GALONIC; DAVID Y. GIN, NATURE, vol. 446, 2007, pages 1000 - 1007
- CHRISTOPHER J. THIBODEAUX ET AL., NATURE, vol. 446, 2007, pages 1008 - 1016
- W. HART ET AL., NATURE, vol. 446, 2007, pages 1017 - 1022
- AJIT VARKI, NATURE, vol. 446, 2007, pages 1023 - 1029
- JOSEPH R. BISHOP ET AL., NATURE, vol. 446, 2007, pages 1030 - 1037
- CHRISTOPHER N. ET AL., NATURE, vol. 446, 2007, pages 1038 - 1045
- PETER H. SEEBERGER; DANIEL B. WERZ, NATURE, vol. 446, 2007, pages 1046 - 1051
- "GenBank", Database accession no. NT_39500
- "GENBANK", Database accession no. CAAA01098429
- "GENBANK", Database accession no. NTJJ78575
- "GENBANK", Database accession no. NT_039353
- "GENBANK", Database accession no. NW_001030904
- "GENBANK", Database accession no. NW_001030811
- "GENBANK", Database accession no. NW_01030796
- "GENBANK", Database accession no. NW_000349
- ALTSCHUL ET AL., PROC. NATL. ACAD. SCI. USA, vol. 87, 1990, pages 2264 - 8
- KARLIN; ALTSCHÜL, PROC. NATL. ACAD. SCI. USA, vol. 90, 1993, pages 5873 - 7
- HIRASHIMA; INOUE, SHIN SEIKAGAKU JIKKEN KOZA 2 (NEW COURSES IN EXPERIMENTAL BIOCHEMISTRY 2
- KAKUSAN: "The Japanese Biochemical Society", 1993, article "Nucleic Acids" IV: "Idenshi no Fukusei to Hatsugen (Gene replication and expression", pages: 319 - 347
- "GenBank", Database accession no. NM_021439
- "GenBank", Database accession no. NM_021528
- "GenBank", Database accession no. XM_355798
- KOIZUMI, M.; OTSUKA E., TANPAKUSHITSU KAKUSAN KOSO (PROTEIN, NUCLEIC ACID, AND ENZYME, vol. 35, 1990, pages 2191
- KOIZUMI, M. ET AL., FEBS LETT., vol. 228, 1988, pages 228
- KOIZUMI, M., FEBS LETT., vol. 239, 1988, pages 285
- KOIZUMI, M.; OTSUKA, E., TANPAKUSHITSU KAKUSAN KOSO (PROTEIN, NUCLEIC ACID, AND ENZYME, vol. 35, 1990, pages 2191
- KOIZUMI, M. ET AL., NUCL ACIDS RES., vol. 17, 1989, pages 7059
- BUZAYAN, J.M., NATURE, vol. 323, 1986, pages 349
- KIKUCHI, Y.; SASAKI, N., NUCL ACIDS RES., vol. 19, 1991, pages 6751
- KIKUCHI; Y. KAGAKU; SEIBUTSU, CHEMISTRY AND BIOLOGY, vol. 30, 1992, pages 112
- FIRE, A., NATURE, vol. 391, 1998, pages 806 - 811
- OCHIYA, T. ET AL., NAT. MED., vol. 5, 1999, pages 707 - 710
- OCHIYA, T. ET AL., CURR. GENE THER., vol. 1, 2001, pages 31 - 52
- NATURE, vol. 391, no. 6670, 26 February 1998 (1998-02-26), pages 908 - 11
- MANDON, E.C.; MILLA, M.E.; KEMPNER, E.; HIRSCHBERG, C.B., PROC. NATL. ACAD. SCI. USA, vol. 91, 1994, pages 10707 - 10711
- OZERAN, J.D.; WESLEY, J.; SCHWARZ, N.B., BIOCHEMISTRY, vol. 35, 1996, pages 3695 - 3703
- ANAL. BIOCHEM., vol. 256, no. 2, 15 February 1998 (1998-02-15), pages 229 - 37
- LONGHU LI, CIRCULATION, vol. 113, 2006, pages 535 - 543

- XIAOMING YI, AM J PHYSIOL HEART CIRC PHYSIOL, vol. 290, 2006, pages H1098 - H1102
- KANG YJ, J BIOL CHEM., vol. 275, no. 18, 5 May 2000 (2000-05-05), pages 13690 - 8
- NOZAKI N, CIRCULATION, vol. 110, 2004, pages 2869 - 2874
- FISHER PW, CIRCULATION, vol. 111, 2005, pages 1601 - 1610
- JUGDUTT BI, CIRCULATION, vol. 108, 2003, pages 1395 - 1403
- SASAKI N, J INFLAMM., vol. 2, 2005, pages 13
- PUCILOWSKA JB ET AL., AM J PHYSIOL GASTROENTEROL LIVER PHYSIOL, vol. 279, 2000, pages G653 - G659
- KIHARA M., GUT., vol. 52, 2003, pages 713 - 9
- KARLINSKY JB ET AL., AM REV RESPIR DIS, vol. 117, 1978, pages 1109 - 1133
- OTTO-VERBEME CJ: "Protective effect of pulmonary surfactant on elastase-induced emphysema in mice", EUR RESPIR J, vol. 5, 1992, pages 1223 - 1230
- JANOFF A ET AL.: "Prevention of elastase-induced experimental emphysema by oral administration of a synthetic elastase inhibitor", AM REV RESPIR DIS, vol. 121, 1980, pages 1025 - 1029
- CHRISTENSEN TG ET AL.: "Irreversible bronchial goblet cell metaplasia in hamsters with elastase-induced panacinar emphysema", J CLIN INVEST, vol. 59, 1977, pages 397 - 404
- LUCEY EC ET AL.: "Remodeling of alveolar walls after elastase treatment of hamsters: results of elastin and collagen mRNA in situ hybridization", AM J RESPIR CRIT CARE MED, vol. 158, 1998, pages 555 - 564
- SNIDER GL; LUCEY EC; STONE PJ: "Animal models of emphysema", AM REV RESPIR DIS, vol. 133, 1986, pages 149 - 169
- JOHNSON KH ET AL., N ENG J MED, vol. 321, 1989, pages 513
- RHODES CJ, SCIENCE, vol. 307, 2005, pages 380
- HAAN MN., NAT CLIN PRACT NEUROL, vol. 3, 2006, pages 159
- PRENTKI M ET AL., J CLIN INVEST, vol. 116, 2006, pages 1802
- SERGIO A; 38 ET AL., HYPERTENSION, 2001, pages 635
- WEINER DE ET AL., JASN, vol. 15, 2004, pages 1307
- ANAVEKAR NS ET AL., N ENG J MED, vol. 351, 2004, pages 1285
- REMUZZI GET, J CLIN INVEST, vol. 116, 2006, pages 288
- TONELLI M ET AL., BMJ, vol. 332, 2006, pages 1426
- KHWAJA A ET AL., KIDNEY INTERNATIONAL
- AMERICAN JOURNAL OF PATHOLOGY, vol. 163, no. 4, 2003, pages 1261 - 1273
- FIEDLANDER M., J CLIN INVEST, vol. 117, 2007, pages 576 - 586
- HARADA T ET AL., GENES AND DEV., vol. 21, 2007, pages 367 - 378
- BRITTIS PA ET AL., SCIENCE, vol. 255, 1992, pages 733
- FISCHER AJ, NATURE NEUROSCIENCE, vol. 4, 2001, pages 247
- OOTO S ET AL., PNAS, vol. 101, 2004, pages 13645
- BATALLER R ET AL., J CLIN INVEST, vol. 115, 2005, pages 209
- IREDALE JP., J CLIN INVEST, vol. 117, 2007, pages 539
- DAI K, WORLD J GASTROENTEROL., vol. 31, 2005, pages 4822 - 4826
- HILLEBRANDT S ET AL., NATURE GENETICS, vol. 37, 2005, pages 835 - 843
- AMENDE ET AL., JOURNAL OF NEUROENGINEERING AND REHABILITATION, vol. 2, no. 20, 2005, pages 1 - 13
- WYNN TA, J. CLIN. INVEST., vol. 117, 2007, pages 524 - 529

Citation (search report)

- [A] WO 2007049424 A1 20070503 - STELIC INSTITUTE REGENERATIVE MEDICINE [JP], et al & EP 1941906 A1 20080709 - STELIC INSTITUTE REGENERATIVE MEDICINE [JP]
- [A] WO 03098184 A2 20031127 - UNIV CALIFORNIA [US], et al
- [A] BAUMGART ET AL: "Inflammatory bowel disease: clinical aspects and established and evolving therapies", THE LANCET (LETTERS TO THE EDITOR), THE LANCET PUBLISHING GROUP, GB, vol. 369, no. 9573, 12 May 2007 (2007-05-12), pages 1641 - 1657, XP022069869, ISSN: 0140-6736, DOI: 10.1016/S0140-6736(07)60751-X
- [A] C. G DE VRY ET AL: "Non-viral delivery of nuclear factor- B decoy ameliorates murine inflammatory bowel disease and restores tissue homeostasis", GUT, vol. 56, no. 4, 1 April 2007 (2007-04-01), UK, pages 524 - 533, XP055470906, ISSN: 0017-5749, DOI: 10.1136/gut.2006.096487
- [A] JOCELYN R. GRUNWELL ET AL: "Carbohydrate Sulfotransferases of the GalNAc/Gal/GlcNAc6ST Family +", BIOCHEMISTRY, vol. 41, no. 44, 1 November 2002 (2002-11-01), pages 13117 - 13126, XP055007798, ISSN: 0006-2960, DOI: 10.1021/bi020507h
- [A] HEMMERICH S ET AL: "Strategies for drug discovery by targeting sulfation pathways", DRUG DISCOVERY TODAY, ELSEVIER, RAHWAY, NJ, US, vol. 9, no. 22, 15 November 2004 (2004-11-15), pages 967 - 975, XP004633808, ISSN: 1359-6446, DOI: 10.1016/S1359-6446(04)03261-1
- [A] HABUCHI O: "Diversity and functions of glycosaminoglycan sulfotransferases", BIOCHIMICA ET BIOPHYSICA ACTA - GENERAL SUBJECTS, ELSEVIER SCIENCE PUBLISHERS, NL, vol. 1474, no. 2, 6 April 2000 (2000-04-06), pages 115 - 127, XP004276547, ISSN: 0304-4165, DOI: 10.1016/S0304-4165(00)00016-7
- [A] M KUSCHE-GULLBERG ET AL: "Sulfotransferases in glycosaminoglycan biosynthesis", CURRENT OPINION IN STRUCTURAL BIOLOGY, vol. 13, no. 5, 1 October 2003 (2003-10-01), pages 605 - 611, XP055007770, ISSN: 0959-440X, DOI: 10.1016/j.sbi.2003.08.002
- [A] KOICHI HONKE ET AL: "Sulfotransferases and sulfated oligosaccharides", MEDICINAL RESEARCH REVIEWS, vol. 22, no. 6, 1 November 2002 (2002-11-01), pages 637 - 654, XP055007771, ISSN: 0198-6325, DOI: 10.1002/med.10020
- [T] KENJI SUZUKI ET AL: "Pivotal Role of Carbohydrate Sulfotransferase 15 in Fibrosis and Mucosal Healing in Mouse Colitis", PLOS ONE, vol. 11, no. 7, 13 July 2016 (2016-07-13), pages e0158967, XP055470858, DOI: 10.1371/journal.pone.0158967
- [T] KENJI SUZUKI ET AL: "New endoscopic approach of anti-fibrotic therapy for inflammatory bowel disease", ANNALS OF TRANSLATIONAL MEDICINE, vol. 5, no. 8, 1 April 2017 (2017-04-01), pages 191 - 191, XP055470898, ISSN: 2305-5839, DOI: 10.21037/atm.2017.03.65

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 JP 2011162558 A 20110825; JP 4585611 B2 20101124; JP 4751956 B2 20110817; JP 5481426 B2 20140423; JP WO2009084232 A1 20110519;
 KR 101926292 B1 20181206; KR 102244872 B1 20210427; KR 20100111282 A 20101014; KR 20160007671 A 20160120;
 KR 20160103554 A 20160901; KR 20170100064 A 20170901; KR 20180132162 A 20181211; KR 20190143485 A 20191230;
 SG 10201402793P A 20141030; SG 10202001748V A 20200429; US 2011027248 A1 20110203; US 2014128452 A1 20140508;
 US 2015290238 A1 20151015; US 2017067058 A1 20170309; US 2019330637 A1 20191031; US 2022340910 A1 20221027;
 WO 2009084232 A1 20090709

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 EP 18151424 A 20081226; EP 20151386 A 20081226; JP 2008004025 W 20081226; JP 2009547912 A 20081226; JP 2010173610 A 20100802;

JP 2011110047 A 20110517; KR 20107016694 A 20081226; KR 20157037089 A 20081226; KR 20167022756 A 20081226;
KR 20177023558 A 20081226; KR 20187034630 A 20081226; KR 20197037818 A 20081226; SG 10201402793P A 20081226;
SG 10202001748V A 20081226; US 201314075919 A 20131108; US 201514704333 A 20150505; US 201615216231 A 20160721;
US 201916237875 A 20190102; US 202217805290 A 20220603; US 80996908 A 20081226